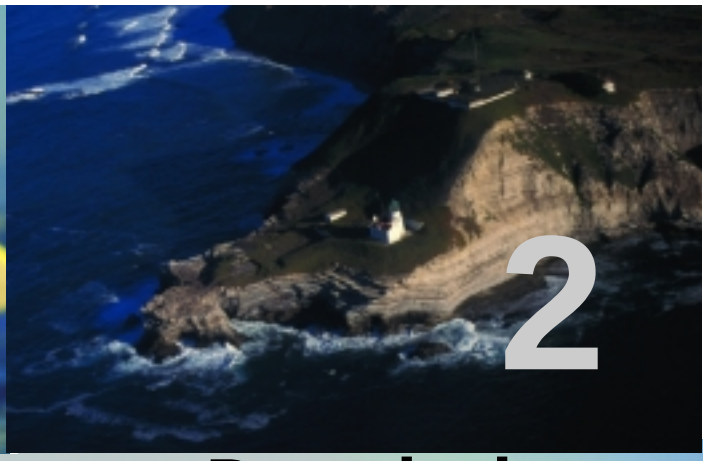

Resource Description

2. Resource Description

Location and Setting

The study area is located in Santa Barbara County, on the central coast of California, covering a 76-mile stretch of coast extending from Point Sal near the northern boundary of Vandenberg Air Force Base (Vandenberg AFB) south and east to Coal Oil Point. Point Sal marks a geographic break between the mountainous Gaviota Coast to the south and the system of low-lying sand dunes to the north. Coal Oil Point, at the other end of the study area, is located on the western edge of the greater Santa Barbara urbanized area (See Regional Context map in the "Maps" section).

The study area extends inland to include all of Vandenberg AFB and coastal watersheds along the south-facing ridge of the Santa Ynez Mountains including near shore intertidal areas. The study boundary includes approximately 215,000 acres.

Jurisdiction and Regulatory Framework

Santa Barbara County controls land uses within its jurisdiction by establishing use categories in the Comprehensive Plan and Coastal Land Use Plan and implementing the plans through the County Zoning Ordinances. The Santa Barbara County *Planning and Development Department* plans for and guides development, and protects resources in the unincorporated areas of Santa Barbara County. The County has jurisdiction over private lands in the county inside and outside of the Coastal Zone, but only has permit authority over state lands in the Coastal Zone. The County developed a local coastal program in compliance with the Coastal Act for land uses within the Coastal Zone. The program includes the land use plans, zoning ordinances, zoning district maps and implementing actions. The County also administers the California Land Conservation Act of 1965 (also known as the Williamson Act) and the Farmland Security Act of 1998 (Super Williamson Act) contracts for agricultural preserves. The contracts are an incentive-based planning tool enacted to keep land in agricultural use, preserve open space land, and promote efficient urban growth patterns.

The *California Coastal Commission* certifies the county's local coastal program, exercises local agency jurisdiction over development in certain geographic areas, reviews amendments to certified Local Coastal Programs, and hears appeals. Within the NPS study area, the Coastal Zone Boundary extends almost a mile inland from the shore in the areas from Coal Oil Point to Gaviota State Park. At Gaviota State Park, the boundary heads several miles inland along Hollister and Bixby Ranches to just north of Point Arguello where it runs approximately one mile from the shore north along the coast at Vandenberg AFB. The California Coastal Commission also works in partnership with the *State Coastal Conservancy* to implement a coastal access program that protects and improves the ability of Californians and visitors to use and enjoy the coast.

The *California Department of Conservation's Division of Land Resource Protection* works with landowners, local governments, and researchers to conserve these resources for the future. The Division of Land Resource Protection provides information to guide land use planning decisions and programs that allow agricultural and open space landowners to voluntarily protect their land.

The *California Department of Parks and Recreation*'s Channel Coast District manages the state parks and beaches in the study area. (Further described under "Public Ownership")

The *California Department of Fish and Game (CDFG)* has statewide jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations. They are responsible for planning and regulatory activities related to threatened and endangered species, species of special concern, hunting, sport

fishing, and related resources and activities.

The *United States Department of Agriculture, Forest Service* manages the *Los Padres National Forest*. (Further described under "Public Ownership")

The *State Lands Commission* manages the State Tidelands, an area of ocean waters from the mean high tide line to three miles offshore. The commission has prohibited oil and gas leasing and development in many areas within the Tidelands offshore of Santa Barbara because of resource sensitivity.

The *United States Air Force* Space Command's 30th Space Wing operates Vandenberg AFB. Vandenberg AFB is entirely within the study area. The mission of the base is to manage and support space lift operations as well as support flight tests of the nation's intercontinental ballistic missile force. The base operates the Western Range network, which consists of instrumentation sites along the California coast and extends to the Hawaiian Islands.

The *United States Army Corps of Engineers* is responsible for regulating the obstruction or alteration of any United States navigable waters. It authorizes transportation of dredged material and the discharge of dredged or fill material into United States waters.

The *United States Coast Guard* is responsible for maritime safety, navigation, and security as well as the national defense and protection of marine resources. The Coast Guard currently operates the Point Conception Lighthouse and Coast Guard Reservation.

United States Department of Interior, Bureau of Land Management (BLM) is responsible for sustaining the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations. (Further described under the Public Ownership section).

The *United States Department of Interior, Fish & Wildlife Service* mission is to work with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The Fish & Wildlife Service enforces federal wildlife laws, administers the Endangered Species Act of 1973 (ESA), manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands.

United States Department of the Interior, Minerals Management Service manages the exploration and development of mineral resources such as gas and oil on the Federal Outer Continental Shelf.

United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service implements and administers conservation areas and ten living marine resource programs pertaining to large pelagic species: California salmon, coastal pelagic fisheries, west coast groundfish, insular fisheries, Pacific sea turtles, eastern tropical Pacific dolphins, Pacific region marine mammals, and Antarctic marine living resources.

United States Environmental Protection Agency works with federal, state, local and tribal governments in the region to enforce the nation's environmental laws. At the state level, the *California Environmental Protection Agency* works to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality.

Ownership and Current Uses

Approximately 60% of land in the study area is held in public ownership. The remaining land is held privately by various landholders. (See Table 1, Landownership within the study area.) Ownership patterns are further discussed on the following page (See Ownership and Zoning map in the "Maps" section).

Table 1: Landownership within Study Area

	Acres*
Vandenberg AFB	99,500
Los Padres National Forest	20,400
State of California	5,500**
County of Santa Barbara	2,000
Other public land	110***
Privately-owned land	87,930
Total	**215,440**

* Approximate values based on parcel data from the County of Santa Barbara

** Includes: 2,500 acres of newly acquired land at El Capitan Ranch

*** Includes: Vista del Mar Union School District, Bureau of Land Management, U.S. Coast Guard

Public Ownership

Vandenberg AFB is the single largest landholding in the study area with 99,500 acres. Activities on the base include missile testing and military, civilian, and commercial space launch activities. Only a portion of the base, 33,180 acres, has been improved. Improved areas include driveways, roads, recreational areas, buildings, helipads, and runways. All other base land is either in its natural state, or managed for non-intensive grazing purposes.

California State Parks manages several properties in the study area, totaling approximately 5,500 acres. These properties include Gaviota State Park, Point Sal, El Capitan and Refugio state beaches, and beach access areas such as Canada del Leon, Canada San Onofre, Canada del Molino, Canada de Guillermo, Corral Beach, and Phillips Tajiguas West. Land has been acquired for a future 2,500 acre state park in the canyon north of El Capitan State Beach.

The County of Santa Barbara manages three parks and other properties within the study area. These include Ocean Beach County Park, Jalama Beach County Park, Santa Barbara Shores County Park, newly acquired land at Point Sal, the Tajiguas Landfill, and the adjacent canyon known as Baron Ranch. The Tajiguas Landfill provides disposal for the unincorporated areas of the south coast of Santa Barbara County, the City of Santa Barbara, Santa Ynez Valley, and Cuyama Valley. The landfill is expected to be in operation under current permits until 2006; the County has a pending expansion application with the State Water Quality Control Board to allow the landfill to operate until 2020.

The US Coast Guard operates the Point Conception Lighthouse. The lighthouse is surrounded by a Coast Guard Reservation, approximately 30 acres in size, covering essentially the entire point.

The study area includes approximately 20,400 acres of multiple-use land within Los Padres National Forest, and the BLM manages 77 acres of land in the Point Sal area as an "Area of Critical Environmental Concern."

The Forest Service manages the Los Padres National Forest according to the 1988 Land and Resource Management Plan (Forest Plan). The Forest Plan emphasizes maintaining the rugged, natural character of the landscape, protecting and enhancing wildlife species and habitat, managing vegetation and hazardous fuels, protecting cultural resources, and providing opportunities for outdoor recreation.

The BLM is responsible for administering the protection of resources under the California Coastal National Monument. This includes the islands, rocks, exposed reefs, and pinnacles above mean high tide within twelve nautical miles of the California coastline.

Private Ownership

Private ownerships include ranches and farms of various sizes, a few commercial and industrial properties, and residential properties. Table 2 lists the ten largest private landholdings within the study area. Agriculture constitutes the predominant use of private lands in the study area, with most of the private lands zoned for agricultural use.

Table 2: Ten Largest Private Landholdings

Landownership	Appx. Acreage*
Bixby Ranch	24,250
Lloyd's Bank/Hanson Family Trust	6,650
Maz Properties	3,650
Poett et al.	3,450
Brinkman	3,305
Schulte	2,800
Rancho Arbolado Partnership	2,500
Doheny	1,520
Exxon	1,475
Parsons	1,225

Source: County of Santa Barbara

* Does not include acreage outside of the study area boundary.

Cattle grazing is the primary agricultural use in the western portion of the study area, principally on the Hollister Ranch subdivision and Bixby Ranch, the two major land blocks in the area. Although Hollister Ranch is subdivided into approximately 100-acre parcels for residential use, it functions as a cattle ranching cooperative where many of the landowners participate in the program by allowing use of their parcels for seasonal grazing.

Agriculture in the eastern portion of the study area is generally more intensive, including a number of cultivated and irrigated specialty crops such as avocado, citrus, cherimoya, and flowers. There is also an abalone aquaculture farm near Dos Pueblos Creek.

The primary commercial facility in the area is the Bacara resort at the eastern end of the study area. The 300-room resort provides recreational and conference facilities in a highly scenic coastal location. Major industrial sites located in the study area include the Chevron Gaviota oil and gas processing facility and marine terminal, the Exxon oil and gas processing facility in Las Flores Canyon, and the Venoco oil and gas processing facility east of Bacara Resort. Several facilities are undergoing the process of decommissioning. These include the Unocal Cojo Bay marine terminal and onshore facility, the Gaviota oil and gas processing facility (partial decommissioning), and various Texaco pipeline facilities along the Hollister Ranch coast.

The Coastal Band of the Chumash Nation owns a 77-acre parcel of land, east of Gaviota State Park. The tribe uses this land for cultural, social, and ceremonial purposes.

Residential properties in the study area range from small lots in the eastern end of the study area to large holdings such as Bixby Ranch with 24,250 acres.

Climate

Santa Barbara County has a Mediterranean climate characterized by mild, wet winters and warm, dry summers. The regional climate is dominated by a strong and persistent high-pressure system that frequently lies off the Pacific coast (generally referred to as the Pacific High). The Pacific High shifts northward or southward in response to seasonal changes or the presence of cyclonic storms. In its usual position to the west of Santa Barbara County, the Pacific High produces an elevated temperature inversion. Coastal areas are characterized by early morning southeast winds, which generally shift to northwest later in the day. Transport of cool, humid marine air onshore by these northwest winds causes frequent fog and low clouds near the coast, particularly during night and morning hours in the late spring and early summer months.

Geology and Topography

The physical geography of the study area includes hills, mountains, terraces, floodplains, mesas, canyons, and rocky headlands. Elevations in the study area range from sea level to more than 4,000 feet at the crest of the Santa Ynez Range (See Topography and Oceanography map in the "Maps" section).

The study area stretches across the Transverse Range geomorphic province (area from Point

Conception to Coal Oil Point) and the southern Coast Range geomorphic province (Point Conception north to Point Sal) creating a geologically complex environment that contributes to the diversity of species in the study area. The Coast Range is oriented north/south, in contrast to the east-west Transverse Range which rotated 90 degrees over the last 17 million years.[1]

Significant Geology

The Transverse Range forms the longest east west trending coast on the Pacific Shore, excluding Alaska.[2]

Rock Formations

The study area is underlain by 35,000 feet of marine sedimentary rock from the late Mesozoic and Cenozoic eras, with limited igneous rock outcrops. Sedimentary rocks range from alluvial fan deposits, dune sand, conglomerate, and diatomite. The upper foothills in the area from Point Conception to Coal Oil Point contain Rincon mudstone, a heavy, unstable clay soil from the Lower Miocene epochs. Structures built on Rincon mudstone have experienced damage due to contraction and expansion.

The coastal cliffs from Surf Beach to Coal Oil Point are comprised of the Monterey and Sisquoc formations from the Miocene and Pliocene epochs. The Monterey formation, comprised of hard, splintery, silicified and diatomaceous shale, accounts for the greater part of rocks exposed in the study area's sea cliffs. The Monterey formation is exhibited in exposed bedrock from Purisima Point south to the Santa Ynez River. The Sisquoc formation is similar to the Monterey formation, containing cherty silicious shale, diatomite and percelaneous silicious shale. Foothills and sea cliffs along the Monterey and Rincon formations and the mountains southeast of Point Sal are prone to landslides and highly susceptible to erosion.[3]

Point Sal and portions of Vandenberg AFB are carved from the Franciscan formation of the upper Jurassic period. This formation includes volcanic rocks, soft serpentine, hard chert, and sandstone. The only other volcanic formations in the study area occur at Point Pedernales and Canada del Rodeo (northwest of Jalama Canyon).

The igneous rocks in the Point Sal region contain ophiolites that are considered an "Area of Special Geologic Interest" by the County of Santa Barbara. Ophiolites are pieces of oceanic plate that have been thrust onto the edge of continental plates. These formations reveal portions of the earth's crust when it began forming from the earth's interior molt an estimated 100 million years ago. According to the Geological Society of America, "ophiolites have been of particular importance in the reconstruction of ancient plate boundaries ever since their recognition as on-land fragments of oceanic lithosphere. The internal architecture of well-preserved ophiolite complexes shows that ophiolites are good structural analogues for oceanic crust, providing three-dimensional exposures and age relations to study the nature of extensional tectonics and magmatic construction in oceanic spreading environments. Thus, ophiolites complement significantly our knowledge of the architecture and generation of oceanic crust that is derived mainly from seismic images and drill holes at mid-ocean ridges."[4]

Detailed study and reconstruction of the California Coast Range ophiolite have been hindered by tectonic shifting and disruption of the sequence, and by generally poor exposures. The ophiolitic sequence at Point Sal, however, "comes nearest to being complete, and it is also relatively well-exposed in sea cliffs and wave-cut patterns."[5]

Significant Geology

The ophiolite series at Point Sal is significant because of its excellent research value. The series is one of the best-exposed and best-studied ophiolites in North America.

Paleontological Resources

Paleontological resources include organic remains, usually older than 11,000 years, which are naturally preserved in rock formations. Significant paleontological resources are unique, rare, and uncommon or add to a specific body of knowledge related to plant or animal taxa. Sites are often found on exposed cliffs, ledges, or steep-sided gullies. Within the study area, continental terraces, Sisquoc, Monterey, Alegria, and Sespe formations (from the Pliocene and Miocene eras) are known to contain vertebrate fossils. In some areas along the coastline, continental terraces are ancient coastal sand dunes that have preserved petrified forests. A petrified forest exists near Bear Creek on Vandenberg AFB. Plant, fish, bird and marine mammal fossils have been preserved in the Sisquoc and Monterey formations. Table 3 lists vertebrate fossils found in locations within the study area.[6]

Faults

The study area landforms have formed from a compression process that has produced many folds and faults. The study area thus experiences a high amount of seismic activity. Santa Barbara County experiences a damaging earthquake about every fifteen years on average.[7] The largest and most active fault that influences the study area is the San Andreas Fault.

The east west trending faults along the coastal areas also generate seismic activity. The area from Coal Oil Point to Gaviota State Park has several faults clustered in the Ellwood area including Glen Annie, Las Varas, Dos Pueblos, and Eagle faults. The most significant faults in the area from Gaviota to Point Arguello are the Santa Ynez and the Pacifico faults. Other faults in this area include Honda, Lion's Head, and Pezzoni faults.[8]

Transverse Range, NPS photo

Table 3: Vertebrate Fossils Documented in the Study Area

Location	Rock Units	Vertebrate Fossils	Age (years before present)
Point Sal	Continental Terrace	Mastodon jaw skull and jaw Ground sloth, camel, horse, mammoth	45,000
Vandenberg AFB (Burton Mesa)	Monterey Formation	Fish/algae imprints	7 - 1 million
Vandenberg AFB	Continental Terrace Deposits	Petrified forest	12,000-26,000
Vandenberg AFB	Continental Terrace Deposits	Mammoth ulna and tooth, horse tooth, bone fragments	45,000-80,000
Cojo Canyon	Continental Terrace Deposits	Mammoth tibia	45,000-80,000
Gaviota State Park	Monterey Formation	Large halibut fish; seal bones	7 - 11 million
Canada de Gaviota	Sespe/Alegria Formation	Oreodont material	26-36 million
El Capitan State Beach	Continental Terrace Deposit	Mammoth bones	45,000-80,000
Source: U.S. Air Force, 1998b			

SOILS

The study area contains a wide range of soil types that provide unique substrates and habitats. Table 4 describes briefly the range of soil associations found within the study area. Soil associations provide a general idea of a region's soil composition and are a useful guide in determining land suitability.[9]

Table 4: Soil Associations

Soil Association	Characteristics	Location(s)
Goleta-Elder-Agueda	▪ Well-drained sandy loams, fine loams, fine sandy loams, loams, and silty clay loams found on flood plains and valleys	Goleta Valley area on nearly level to moderate slopes
Camarillo-Aquepts	▪ Nearly level, poorly and very poorly drained fine sandy loams on low flood plains and tidal flats	Goleta Valley adjacent to the beaches
The Milpitas-Positas-Concepcion	▪ Nearly level to steep, moderately well-drained fine sandy soils on terraces ▪ Used for orchards, truck crops, range or urban development	Coal Oil Point to Gaviota Pass
Concepcion-Botella	▪ Moderately well-drained loamy sands, fine sandy loams, and silty clay loams ▪ Used for range, dryland hay, and pasture	Point conception area on terraces and small valleys adjacent to the pacific coast
Ayar-Diablo-Zaca	▪ Well-drained clays found on gentle to steep upland slopes ▪ Used for avocados, lemons, dryland hay, pasture, and for urban development	Foothills of the Santa Ynez mountains in narrow bands from Summerland to Gaviota pass
Lodo-Sespe-Todos	▪ Well-drained gravelly clay loams and clay loams on strongly steep to very steep slopes ▪ This association is used for range, avocados, and lemons	Found along a narrow band that parallels the pacific ocean in the foothills of the Santa Ynez mountains between Rincon creek and Gaviota pass
Los Osos-Gaviota-Maymen	▪ Found on strongly sloping to very steep slopes and characterized by excessively and well-drained sandy loams, clay loams and stony fine sandy loams	Found west of Gaviota pass in the northern part of the study area
Naciemento-Linne-Capitan	▪ Found on moderately steep to very steep, well-drained, calcareous silty clay and clay loams ▪ This association is used for range	Found along a narrow band paralleling the pacific coast from Gaviota pass to point conception
Santa Lucia-Lopez-Crow Hill	▪ Well-drained, calcerous silty clay loams, clay loams, and cobbly clay loams on uplands ▪ This association is used for range and diatomaceous earth mines	Found on strongly sloping to extremely steep slopes in the vicinity of Jalama creek and Miguelito creek
Capitan-Linne	▪ Includes well-drained, calcareous clay loams and cobbly clay loams found on moderately steep to very steep slopes ▪ The primary use is range	Found in a narrow belt adjacent and parallel to the pacific ocean in the vicinity of Refugio canyon
Maymen-Rock	▪ Well-drained stony fine sandy loams and excessively drained rock outcrops ▪ Primary use of the association is for watershed, however a few areas with less steep slopes have range or building sites	Located in the Santa Ynez Mountains on moderately to extremely steep slopes
Chamise-Arnold-Crow Hill	▪ Soils are characterized as well to somewhat excessively drained sandy to clay loams on high terraces and uplands	Found on gently sloping to steep terrain along the Casmalia Hills on VAFB
Shedd-Santa Lucia-Diablo	▪ Characterized by as well-drained, shaley, clay loams and silty clays on upland areas	Found on strongly sloping to very steep terrain on the Purisima Hills and Santa Ynez Mountains on VAFB
Dune Sand	▪ Characterized by weakly consolidated, sand dunes comprised of clayey loam, clay, loam and other miscellaneous types west of the dune sand	Found on the San Antonio Terrace and other dune areas on VAFB
Marinio-Oceano	▪ Well-drained sands on mesas and dunes	Found on Lompoc Terrace and Burton Mesa
Tangair-Narlon	▪ Poorly-drained and moderately drained sands and loamy sands	Found on nearly level to strongly sloping terrain on the Burton Mesa
Los Osos-San Andreas-Tierra	▪ Well-drained fine sandy loams, sandy loams and clay loams on uplands ▪ This association is used for range and is moderately to severely eroded	Found in the Santa Ynez Mountains in the southern portion of VAFB on strongly sloping to very steep slopes
Sources: Shipman, 1981, U.S. Air Force, 1997		